PATENT SPECIFICATION
NO DRAWINGS

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COMPLETE SPECIFICATION

Veterinary Compositions comprising Zinc Compounds

We, OY MEDICA AB, a Company organised under the laws of Finland, of Toolonkatu 26 b, Helsinki, Finland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

The present invention is concerned with an injectable veterinary composition for use in the treatment of vertebrate animals.

Zinc has been found necessary for the metabolism of all vertebrate animals. Deficiency of zinc appears in swine as parakeratosis, but as late as in 1956 it was the belief that zinc deficiency could not occur in cattle, because their daily nourishment contains a sufficient amount of zinc. It has now been found, however, that cattle, too, may suffer from parakeratosis caused by zinc deficiency. The reason for this is probably the increasing use of calcium in farming and cattle-raising, which has resulted in a too high calcium percentage in the food of highly productive animals. Now the effect of zinc on the organism depends very much on the prevailing calcium balance, and zinc deficiency has been found to occur as a result of overdoses of calcium or of a disturbance in the calcium-phosphate balance. Also in connection with calcium injections hypercalcemia easily occurs and, with it, phosphorus and zinc deficiency.

Zinc deficiency may be cured by adding zinc to the food, but a therapeutic result is then attained only after a long lapse of time. Besides, many properties of zinc salts are a disadvantage and even an obstacle to this kind of treatment.

An overdosage of calcium in the food as well as calcium injections may, as pointed out, cause hypercalcemia and, with it, phosphorus and zinc deficiency. Now the observation has been made that after a disadvantageous or ineffective calcium treatment a normal condition is regained with phosphorus or zinc injections. An injectable preparation containing zinc as well as phosphorus therefore would solve the problem in the most ideal way. But zinc salts added to a solution containing phosphates give a zinc phosphate precipitate. This, however, is not the case if a zinc chelate, is used. Such a zinc chelate gives with phosphates a clear injectable solution, the zinc of which surprisingly enough is physiologically fully effective. This fact is the base for the invention. Furthermore complex-bound zinc has one more great advantage as compared to other zinc compounds: it does not irritate the tissues.

The phosphorus-zinc solution which falls within the scope of this invention, is prepared by dissolving a zinc chelate, for example a zinc compound of ethylenediamine tetraacetic acid or nitriloacetic acid, in a phosphate solution. To this solution can be added other physiologically active substances and stabilizing agents.

The following are some examples of the compositions containing zinc chelate. The invention is not limited to these examples.

EXAMPLE 1

Dipotassium hydrogen phosphate K_2HPO_4	8.0 g
Disodium hydrogen phosphate $Na_2HPO_4 . 12H_2O$	90.4 g
Sodium dihydrogen phosphate $NaH_2PO_4 . 2H_2O$	182.0 g
Nikethamide	10.2 g
Zinc disodium ethylenediamine tetraacetate	109.3 g
Methyl-p-hydroxybenzoate	1.6 g
Sterilized water, sufficient to produce	2000.0 ml

The methyl-p-hydroxybenzoate is dissolved by heating in water (1500 ml). In the solution thus obtained the other ingredients are dissolved one by one and, finally, the remainder of the water is added to produce 2000 ml.

The solution is filtered and filled into 100 ml containers, which are sterilized in an autoclave at 120°C for 20 minutes.

EXAMPLE 2

Dipotassium hydrogen phosphate K_2HPO_4	8.0 g
Disodium hydrogen phosphate $Na_2HPO_4 . 12H_2O$	90.4 g
Sodium dihydrogen phosphate $NaH_2PO_4 . 2H_2O$	182.0 g
Zinc Chloride $ZnCl_2$	33.3 g
Disodium ethylenediamine tetra-acetate	91.0 g
Methyl-p-hydroxybenzoate	1.6 g
Sterilized water, sufficient to produce	2000. ml

The methyl-p-hydroxybenzoate is dissolved by heating in water (1500 ml). The phosphate are added. The sodium salt of ethylenediamine tetraacetic acid is dissolved in water (300 ml) and the zinc chloride added, whereby the zinc chelate, zinc disodium ethylenediamine tetra-acetate is formed. When all is dissolved, the solutions are mixed, the pH is adjusted to 5.8 with sodium hydroxide and the remainder of the water is added to produce 2000 ml. The solution is filtered, filled into 100 ml containers and sterilized as in Example 1.

EXAMPLE 3

Calcium borogluconate	11. 4 g
Magnesium borogluconate	2.75 g
Glucose	88. 5 g
Zinc disodium ethylenediamine tetraacetate	5.46 g
Chlorocresol	0. 5 g
Thymol	0.02 g
Sterilized water, sufficient to produce	500.0 ml

Prepared as in Example 1.

The solution containing zinc as well as phosphorus which falls within the scope of this invention, is intended for parenteral administration in the treatment of diseases caused by dietary and functional zinc deficiency in animals. When sodium and potassium phosphates are used, the proportion of sodium to potassium must be the same as in the blood. Since also phosphorus deficiency is one of the more common scourges of cattle-raising in many countries, the phosphorus content in the product is of greatest importance.

The product of the invention has been used with success against diseases caused by zinc deficiency. In addition to its use in such cases, it has been used in the treatment of diseases such a paresis puerperalis and in the treatment of weak or sick animals. After an ordinary calcium injection the percentage of the important inorganic phosphorus in the blood rises slowly, the normal level being reached in 3 to 12 hours. Only then can the animal stand up, since, due to an obvious disturbance in the adenosine triphosphate metabolism, the muscles do not work. By giving calcium and phosphorus a normal condition is often regained, but in a better way this can be achieved by injection of a composition according to the invention. The normal condition is then regained within 3 minutes, during which the alkaline phosphates in the blood has risen from 0.6 to 1.00 Bodansky Unit, the blood calcium from 6 mg per cent to 10 mg per cent and the phosphorus from 1.4 mg per cent to 3.1 mg per cent. This treatment has been tried on a great number of cattle, always with the same good result. It can be mentioned that the amount of calcium secreted in the urine rose from 6 mg per cent up to 27—30 mg per cent, the secretion of phosphorus and magnesium rising simultaneously.

Particularly in the early spring, parakeratosis occurs in cattle and pigs. On treating such cases with the composition containing complex-bound zinc and phosphorus according to the invention the symptoms quickly disappear.

WHAT WE CLAIM IS:—

1. An injectable veterinary composition comprising an aqueous solution containing phosphate ions and zinc, the zinc being present in the form of a watersoluble zinc chelate compound.

2. An injectable veterinary composition as in claim 1 wherein the source of phosphate ions is formed by alkali metal salts of phosphoric acids.

3. An injectable veterinary composition as in claim 1 wherein the zinc chelate is an ethylenediamine tetra-acetic acid chelate.

4. An injectable veterinary composition as in any of claims 1 to 3 wherein bactericides have been added as preservatives.

5. An injectable veterinary composition substantially as herein described with reference to example 1 or 2.

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